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The last millennia history of detrital sedimentation in the Lower Seine Valley geosystem (Normandy, NW France)

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Actually, the respective role of climate and Man in the Holocene environmental changes is still debated. It is obvious that those factors are together implicated in changes in hydrological balance, soil erosion and terrigenous sedimentation. Indeed regional synthesis showed the increasing human pressure in combination to climatic variability since the Neolithic time. Thus, in Northwest Europe, increasing land use is well documented as forest clearance or alternation of deforestation and farming periods and of forest recovery episodes. In this aim, the lower valleys were particularly sensitive to changes in recent mutation and provide valuable Holocene archives to track changes in sedimentary dynamics. In this way an accentuated fine alluviation is often associated with land human activities linked to erosive processes during climatic oscillation in Northwest European valleys. In the West Paris Basin, in Normandy, France, several studies emphasized a single forcing on the Quaternary and Holocene evolution: climate changes or sea level rise or human activities in the Lower Seine Valley (LSV).

Research on Holocene sequences, field, palaeoenvironnemental data and archaeological investigations from the Lower Seine Valley and tributaries result in a global vision of the erosional processes at the origin of detrital inputs and terrigenous records. Reading on those records we define three main sectors of the Lower Seine Valley: Estuarine zone, Fluvial zone and Tributaries. We define seven erosional/detrital phases directly or indirectly triggered by the increase anthropogenic pressure combined, or not, to climate change. Those phases are the key periods of changes on major terrigenous sedimentation events.

During the Early Holocene climate pejoration, a deep and linear under-scour of plateaus and changes in drainage network load to the “Mesolithic detritism”. Those sediments with proximal origins, were firstly recorded in the estuarine zone and after in the fluvial zone.

During the Mid-Holocene transition the deglaciation load to the increase in hydrologic fluxes. Only the estuarine zone was interested by sea level change and the fluvial zone and tributaries show a relative environmental and slope stability (biostatyc conditions) related to forest plant cover. Only a peatland and autochthonous sedimentation characterize the fluvial zone affected by regional phreatic-level rise. This biostatyc period was break off when the Late Holocene erosional processes pickup. Those processes lead to a radical change in sedimentation witch switch over from proximal to distal origins. The consequent detritism was firstly recorded in TSR with the grey clay, then in the whole fluvial environments with organic silts and after in the estuarine zone with laminated sand with silt. Forest clearance and agricultural development were the main responsible factors of this induced detritism documented in the whole Paris Basin and in Northwest Europe. The transition from forested to open environment play in favour to a pickup of runoff processes and the organic accumulation in peatland was progressively substituted by terrigenous detrital supplies in marsh and swamps. The Bronze Age metallurgy development and tillage practices induced this detritism in the whole environments. From the end of the Bronze Age and the Iron Age a drastic increase in the anthropogenic pressure on the regional sedimentary dynamics was the main responsible for the detritism recorded in the fluvial zone (quartzy silt) marking the end of the organic sedimentation in this part of the LSV. During this time grey clay carried on depositing in tributaries. During the Middle Age a generalised detritism was recorded in the whole region. Finally, XIII-XIV-XVth centuries corresponds to the agricultural revolution and the plough employ generally introduced in the whole region. All informations collected about erosional forcings factors and sedimentary responses in the region, lead to lay at the anthropogenic pressure the main role since the Neolithic time. The human pressure is the first cause of the regional detritism start out.

The LSV experienced a pattern of soil erosional processes similar to that of numerous valleys in northwestern Europe. A multiplication of sites and more accurate analyses in the tributaries are needed in order to have a better global view of the detrital-erosional phases and the associated terrigenous fluxes. Future research will focus on tributaries sites which are not study until now.